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TRANSLATION.

ON PENETRATING WOUNDS OF THE EYE DUE TO PIECES OF COPPER, AND THEIR TREATMENT.

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Penetrating wounds of the eye due to pieces of copper are of a special kind. This metal can cause purulent inflammations by its chemical action alone, so that without the help of microbes hypopyon and purulent infiltrations of the vitreous body may result. Moreover, it is especially noxious to the retina and produces detachment or atrophic degeneration. In consequence of this dangerous character of these foreign bodies it must be our principal aim in the treatment to extract them promptly.

When a piece of copper lies in the anterior chamber upon the iris or the crystalline lens, its extraction is, generally, not very difficult. Then the inflammation disappears and the eye is saved, at least if there are no other complications. If the

inflammation, which is exceptional, should continue after the extraction of the foreign body, this must be considered as due to microbic action.

Since nearly all these foreign bodies are pieces of caps, we must suppose, that the adherent infectious germs are usually either killed by the heat of the explosion, or arrested in their development by the chemical action of the copper. We meet with the greatest difficulty when the foreign body is situated in the posterior part of the eye. In recent cases, when there is but little or no inflammation, when we can see the foreign body or at least guess its position with some certainty, there is no doubt that we must attempt its extraction at once, unless it should be a very small piece.

However, when it is hidden by blood, by a cataract, or by purulent infiltration in the vitreous body, the eye is, generally considered as lost and condemned to enucleation for fear of sympathetic ophthalmia.

For several years I have used a different method; I attempt extraction, even, when the chances are very uncertain, and in spite of a beginning infiltration of the vitreous body, whenever I can suppose, that the infiltration is of a chemical origin only.

I have briefly outlined my ideas on this subject a few years ago in my book on inflammation, and I desire now to give a more detailed account of my experiences since gained.

At first I shall respond to an objection which I foresee. The wisdom of trying to preserve an eye attacked by purulent inflammation of the vitreous body may be doubted, especially, when it contains a foreign body which under the circumstances can not be removed except by a dangerous operation. Will the successful extraction be of really benefit to the patient? Will not the inflammation or the danger of sympathetic ophthalmia persist or be even aggravated, so that sooner or later we will be forced to enucleate the eyeball?

Experience alone can give a definitive answer and I believe that mine is sufficient to give it in the negative sense. Before, however, speaking of facts, I desire to prove that the danger of sympathetic ophthalmia is not a principal objection.

If it is true, that sympathetic ophthalmia is due to the immigration of microbes, then there can be no such danger when the lesion is not complicated by microbes. An inflammation due to a chemical action will be limited to the diseased eye, because the infinitesimal quantities of metal dissolved in the fluids are absorbed before reaching the fellow-eye.

The essential thing in every particular case would, therefore, be, to know whether the inflammation is caused by the combined action of microbes and metal, or by the metal alone. I have already alluded to this fact, and it is proven by clinical observations as well as by the histological researches of Dr. Kostenitsch, that lesions by copper are, in the majority of the cases, aseptic. Consequently, if the symptoms are such, as we usually meet with, if the inflammation is not intense, and if the purulent infiltration of the vitreous body remains circumscribed, the probability that the lesion is aseptic, is very great. It is true, that these symptoms are not absolutely convincing and we must, therefore, try to gain direct proof by examining the exudation and the foreign body after their removal from the eyeball by means of cultures and with the microscope. With very few exceptions, the results of my examinations have been negative. A further proof is furnished by the prompt healing of the wound and the disappearance of the inflammation.

Whenever microbes were found or when in spite of a negative result of the cultures the inflammation did not disappear in the usual time, the eye was removed.

Out of 46 cases of lesions due to the penetration of pieces of copper or brass into the eye, observed during twenty-three years, 6 concerned the anterior chamber and iris, 40 the posterior part of the eyeball, but 38 only were treated. In 9 of these 38 I at once proceeded to enucleation or exenteration. The removal of the foreign body was attempted in 25 cases and in the remaining 4 I only made a preparatory iridectomy or a cataract operation.

Of the 25 cases in which the extraction was attempted, 18 were successful (72%), 7 were unsuccessful (28%); to this number we must add 6 successful extractions from the anterior

chamber, so that in 24 out of 31 cases the foreign body was removed. In 2 of the 18 cases in which the foreign body was removed from the posterior part of the eyeball, I have enucleated finally and in a third case I have advised enucleation.

Among the remaining 15 cases there are 7 in which simply the shape of the eye was preserved, in 8 a certain amount of vision was saved which varied from counting fingers at one meter to one-sixth of normal vision. Several times this vision was lost gradually in the following years, but without inflammation or atrophy of the globe.

I shall now make a few more detailed remarks on the different kinds of cases.

In cases of septic infection, recognized by the beginning of a purulent panophthalmitis, a conservative treatment was of course, out of question. All of the other primary enucleations were made in aseptic lesions, when it was impossible to ascertain the position of the foreign body, or when the accident had occurred a long time before and tension and light perception were diminished to such a degree, that it was clear, that a total detachment of the retina had taken place.

The best cases for the extraction are the recent ones in which there is little or no inflammation, no hæmorrhage, no injury to the lens, in which the shining metal can be seen floating in the vitreous body or attached to the retina. With the most favorable circumstances, however, we are not at all sure of success, especially since here a magnet is of no use.

In three cases of this kind I have succeeded in extracting the foreign body through a meridional section in the sclerotic, either by enlarging the original wound, or by making a new wound corresponding to the actual position of the foreign body. As in all other cases, this wound healed normally by means of antiseptics. In one of these three cases, in which the operation had been very difficult, vision fell to counting fingers close to the eye; in the second case, fingers were counted at twenty feet; in the third case, in which an extraordinarily large foreign body was extracted without any difficulty, the

eye had been too badly damaged by the injury to allow of more than perception of light.

I may mention here another case of recent injury in which the foreign body was hidden by a hæmorrhage. The magnet was applied in vain, since the injury was not, as the patient thought, due to iron, but to copper. The error was only discovered four weeks later. The wound had already been healed, when a small protusion of the size of a pin-head showed in the scar, and through a small incision the foreign body came out easily.

In recent cases with dimness of the lens the position of the foreign body can be recognized with difficulty only, or not at all, and we can only guess it, particularly by means of the limitation of the field of vision, by the corresponding position of the wound in the cornea or sclerotic, in the lens and iris. This, however, may deceive us, for the foreign body may have fallen into the vitreous body.

Even, when the lens is intact, the foreign body is usually hidden after two weeks by a purulent infiltration of the vitreous body which surrounds it. As an exception, the dimness develops more slowly; I saw in one case after six months a small piece of copper in the vitreous body veiled only by a slight dimness.

The purulent infiltration ordinarily does not spread beyond the neighborhood of the foreign substance, where it is most intense. Even, when the copper itself is no longer visible, we may, therefore, judge what its position is by the direction in which the yellow reflex from the background is most intense. In partial opacity of the lens this infiltration may, even, serve as a guide when a single small foreign body should be totally hidden.

Even, when we have to overcome such difficulties, the extraction of a foreign body may be successful in half of the cases. Under all circumstances, it should be attempted, whenever there is some vision or at least satisfactory perception of light.

The following observations show that useful vision may yet

be given, when purulent infiltration of the vitreous body had already begun to develop.

CASE I.—Lesion by a cap two weeks previously, in a girl of 10 years. Small wound of the sclerotic near the inner-upper margin of the cornea. Yellow reflex from the vitreous body hiding the foreign body. Some hypopyon. Counts fingers at 6 meters. Extraction of the foreign body by means of a triangular flap at the point of entrance. Conjunctival suture. Cultures from the exudation sterile with one exception. Rapid healing with gradual absorption of the opacity of the vitreous body. Vision, four weeks later, $\frac{6}{xxxvi}$, no detachment of the retina. Ten months later the patient writes that she can see everything with the injured eye.

CASE II.—In a similar case the extraction was made twenty-six days after the injury, by means of a meridional section through the sclerotic. The cultures remained sterile. Sixteen days later the infiltration of the vitreous body had greatly diminished, vision was somewhat better than before the operation; she counted fingers at 20 feet. Three years later vision was almost lost by a cataract, but could have been restored by an operation.

In the three remaining cases of this kind the perception of light had already been reduced at the time of the operation to such an extent, that the form of the eyeball only could be preserved.

There remain three more cases of secondary extractions complicated with traumatic cataract. If, in these cases, the foreign body has pierced the eye in an oblique direction, it may with great probability be found on the inner surface of the ciliary body, or behind the lens. Under these circumstances I have made an iridectomy in order to remove as much of the cataract as possible; then I have tried to extract a little of the infiltration tissue around the foreign body in order to make it visible. When I do not succeed, I make one or two meridional incisions through the ciliary body, beginning at the extremities of the iridectomy and perpendicular to these. In this way a large flap is formed, which can be turned back and

allows us to see the anterior portion of the vitreous body. If the flap is in the right place, the infiltration tissue around the foreign body can be seen and cut out.

In a patient who had previously undergone an operation for traumatic cataract with iridectomy and where the foreign body had not been found, I extracted it nine days later by means of a flap in the ciliary region. This eye not only healed without shrinking, on the contrary after another six months a second iridectomy restored vision to such a degree that the patient could count fingers at 18 feet. Unfortunately this vision was lost again later on by a detachment of the retina which could be seen with the ophthalmoscope. The effect might, perhaps, have been lasting, if I had added the ciliary incision to the first operation.

In two other cases with traumatic cataract the foreign body was extracted from the vitreous body through the incision made for the cataract extraction. In one, operated on two weeks after the accident had occurred, the visual result was pretty good and had not deteriorated seven years later. In the other, operated on ten days later, fingers were counted at 15 feet; four years later vision was reduced to counting of fingers close to the eye on account of a secondary cataract, which, however, gave good chances for a further operation.

Another proof of the innocuousness of the ciliary section is furnished by a case of recent injury with cataract in which the foreign body was not yet surrounded by exudation of purulent matter, as in the case just related.

This operation was made two days after the accident and four months later an iridectomy was added, by which one-tenth of vision was regained, the general condition of the eye being very satisfactory.

In all other similar cases there was no longer any question of saving vision. However, even then, although the operation would have been possible at an earlier date, the inflammation generally disappeared very rapidly and was followed by a very moderate shrinkage, which in all likelihood, should have developed without the operation.

In the two cases, previously mentioned, in which it was judged expedient to finally practice enucleation, the anatomical examination gave me the impression that it had not been necessary.

In fact, I have never seen sympathetic ophthalmia or even sympathetic irritation attack the fellow eye.

In cases of opacity of the media of the eyeball the non-success was usually due to an error regarding the exact situation of the foreign body, which had either penetrated farther into the eye, or fallen into the vitreous body. The examination of the enucleated eyeball showed regularly why the method of extraction could not succeed. Nevertheless, in 9 cases out of the 17 in which the foreign body was totally hidden, I was fortunate enough, to extract it, so that even these cases are not totally hopeless.

I may, furthermore, speak of a certain kind of lesion, the symptoms of which do not at first differ materially from those of an ordinary traumatic cataract. The inflammation is slight and sometimes for a time disappears altogether. Vision corresponds with the optic condition of the eye. Since the cataract is in the way of seeing the position of the foreign body, I first try to make it disappear by means of discission or extraction. In one case only, after absorption of the cataract following discission, I could indistinctly see a piece of copper in the vitreous body. In four other cases, although a certain degree of sight was restored, the foreign body remained invisible. Consequently, with one exception, extraction was not attempted and the regained vision was generally lost after a short time.

In one of these cases, when dissecting the eye which had been enucleated, I made the astonishing discovery, that it contained no foreign body, but only a slight exudation in the infiltrated zonula. Since I have seen, how copper filings, when put on the iris of the rabbit, are gradually absorbed, I believe that in this case, also, a small foreign body disappeared by absorption. This possibility explained also the following observation: During the extraction of a traumatic cataract the ex-

pected foreign body did not come out, yet, three months later I could see a little body floating in the pupil, evidently suspended by an invisible filament. This, when removed, consisted of a thin piece of copper of the size of one-half to one millimetre covered by an organic substance; it was so thin, that when I grasped it with the forceps, it was reduced to powder. Since it would have been unable to perforate the sclerotic in so fragile a condition, it must necessarily have been modified and partially absorbed by the fluids of the eye.

I do not want to go into further details. I hope to have shown, that the conservative treatment of penetrating injuries by copper deserve of the greatest attention. I am convinced that it is wrong to enucleate an eye which encloses a piece of copper, as long as the function of the retina is intact; even in those cases in which vision cannot be restored, I believe it is preferable to attempt to save the eye, since the danger of sympathetic ophthalmia is an exceptional one. This of particular importance for the patients from among the working classes, for, as is but right, they prefer a natural eye, even if blind and disfigured, to the best artificial one, and, moreover, the conservative treatment gives us the satisfaction, at least in a number of cases, to save a small amount of vision in an eye, which formerly we should have considered as absolutely lost.

—*Révue Gén. d' Ophth.*

SELECTIONS.

DEFECTIVE VISION IN ITS RELATION TO CRIME.¹

BY FRANK VAN FLEET, M.D.

¹Read before the New York Academy of Medicine, October 18, 1894.

The subject of crime presents to the student of human nature so many sides that, in its study, he is at a loss to know just which side to attack. It is perhaps natural that each student should begin at the side which, in his judgment, seems the most important. Naturally, the physician begins with the causes, and ends with the cure.

In carefully looking over the ground, we find that we can divide the causes of crime into two groups, namely, the moral and the physical. It is not possible in a paper, on the causes of crime from a medical standpoint, to separate the physical and the moral entirely. They are so dependent on each other; and both so important that we find our thoughts constantly drifting backward and forward between the two.

A comprehensive study of crime and criminals would occupy more time than we have at our disposal to-night, and I have therefore endeavored to limit my remarks to one of the most important physical causes, namely, defective vision.

The proportion of crime and criminals to population is increasing. Writers are not wanting who will tell you that education increases crime. The statement is true; education and enlightenment do not only increase crime but cause it. To make this unqualified assertion, however, is unjust and mislead-

ing. These factors do increase crime, but not necessarily in the possessors themselves. The increase is rather among those who have to compete with the educated. So it might be, and is said, that it is the very lack of education that is the cause. But neither education nor the lack of it are in themselves sufficient to cause crime, as I shall show later on.

Crime dates back as far as history extends. Thousands of years before the historical era, long before the days of Moses and the Patriarchs—as long, indeed, as forty thousand years ago—man wandered upon the face of the earth in herds, even as a few years ago the buffalo lived on the Western plains. There were in those days no ties of family; father and son, sister and brother, were no more to each other than so many members of the common flock. Children honored and respected their mothers only so long as the mother was necessary to the offsprings's existence. In those days there were no crimes, because there were no laws. The existence was precarious. Every individual was a law unto himself. The strong triumphed over the weak because might made right. The weak and delicate, if there were any, perished. The law of the survival of the fittest here found its most marked exemplification. Flourishing in the warmth and luxury of the summer, freezing and starving during the long and severe winters, this herd of animals of perfect physical development, lived on. Slowly, on through the centuries, this existence continued, every generation probably advancing beyond the preceding, until, gradually, intellectual man began to expand. With this expansion came thought of comfort and desires for better things; in short, ambition. Now the family began to be a gathering separate from the herd, the migratory habit ceased, places of settlement became permanent, and the former herds populated towns or became fixed settled bodies of individuals, divided into families of father, mother and children.

Each family became a separate and distinct body, but bound together for mutual protection. The strong still endeavored to triumph over the weak, and the weak were probably more numerous than before; the new feeling which had grown up—

family love—made the stronger members protect the weaker. But outside the family were others who would still look with longing eyes, and covet a neighbor's wife or servant, house or land,—feelings and longings which, in their former condition, were gratified by simply taking possession.

Now the integrity of the whole demanded that the weak should be protected, and laws were made sufficient unto the time. Here, then, was the first step in the establishment of crime. Acts which now came under the bane of society, were looked on with indifference by the herd; but the enactment of law made these acts crimes. Increasing intellectual development has, of course, added to the laws, and with the increase of laws so has crime kept place. Not, however, that there are any more acts committed against society, but the moral tone of society is so far elevated, one generation above the other, that acts condoned in the days of the father become crimes during the generation of the son. As education and enlightenment walk hand in hand, it is not to be wondered at that crime should increase. Neither is the increase a matter for regret; but rather a healthy sign of the times.

But, as in ages when there were no laws, and down through the centuries that intervene until our time, there have always been people who would resort to measures not to be commended, to obtain the means of existence, or to gratify desires. On this point much has been said. Reasons have been given, diverse in many particulars, why we should have criminal classes.

The physical reasons for crime can generally, however, be brought into a small group, and considered under two heads, viz.: heredity and environment. The moral side, as I have already said, is of great importance, and admits of much argument. While we will not enter into it, we may say that the strong point of most writers on the social question, is the statement that the misery and distress found in this world is due to the ignorance, neglect or contempt of the natural rights of man.

The influence of heredity in the production of crime is more

than doubtful. So great is it considered by some, however, that the enactment of laws to prevent the propagation of children by criminals has been advocated. It would be very difficult to prove that man bequeathed to his offspring tendencies, either criminal or otherwise, as a natural heritage. The weight of evidence is, to my mind, against the truth of such a claim. We have no less an authority, than Supt. Byrnes, of the New York Police Department, as published in the *North American Review* for July, 1894, as follows: "A good deal is said nowadays about the causes of crime, and crime as an hereditary disease. I have observed that most of the crime committed in New York is due chiefly to two causes—drink and environment." * * * "I have seen men so corrupt that it seemed to me as if a tendency to commit crime must be in their blood; but on the whole, I do not put much faith in the theory that criminals are born with an irresistible tendency to evil-doing. I know that children of criminals are very apt to become criminals themselves," and he then goes on to show that, as their homes are the resorts of criminals, the children very naturally fall into vicious ways.

It is supposed that certain physical attributes are handed down from one generation to another. Features of the father are reproduced in the son. Physical characteristics are said to distinguish races. The Ethnologist claims to be able to tell by the shape of a skull or a jaw-bone the race to which its owner belonged. In families not only shapes of heads and features, but color of hair, eyes, and general build, are said to distinguish one family from another. If we believe in the theory of the separate origin of races, it is easily understood why differences should exist in their anatomical peculiarities, but even here we find diversity of opinions. As Prof. M. J. Weber said as long ago as 1830, "There is no proper mark of a definite race-form of the cranium, so firmly attached, that it may not be found in some other race." (See "*Crania Britannica*.")

The resemblance between members of the same family will depend on two things, namely—First, the imagination of the

observer; and, second, on the fact. Great differences of opinion will exist with different observers. One will declare two brothers look alike, notwithstanding one is short and the other tall; one is dark and the other light; one stout and the other slim; and, in fact, their appearances may be entirely opposite. On the other hand, persons between whom there exists no relationship whatsoever, except that they belong to the same race, frequently bear to each other the most striking resemblance. This resemblance, which is often so marked as to make it difficult to distinguish one from the other, may be due to the effect the mental working has on the facial expression. As certain thoughts will be expressed by certain movements of the face, as grief, joy, recognition, etc., which movements are due to involuntary or reflex muscular actions, so people who are accustomed to think in certain lines, after a while become to look alike. Physicians resemble each other; lawyers, cobblers, tailors, and, in fact, nearly every class of professional men and artisans, have certain actions and expressions, due to their habits and ways of thinking, that distinguish them one from the other.

What is more likely, than that this resemblance should be greater in families, between brothers and sisters, than among strangers? What could be more natural than that a son should resemble his father in feature, gesture and general action, for this reason alone? A very excellent paper on this subject, well worth reading, will be found in the *Popular Science Monthly*, Vol. xlv, No. 3, the title of which is "On Acquired Facial Expression," by Louis Robinson, M.D.

So it may be said that physical resemblance between members of the same family, is largely imaginary, and where it does really exist, is due to training and not to heredity.

We must, of course, admit that heredity does play an important part in the development of certain of the lower animals. But it does not seem to me that there is any analogy between them and man in this particular. Certain physical characteristics are made to appear in certain breeds of animals, generation after generation; but it is only with the greatest diffi-

culty that it is kept up, necessitating the selection of animals for propagating, and even with the greatest care, the breeds tend to return to their original conditions. It may be that, by proper selection, we might be able to apply these same rules to man, but I do not think it at all probable that such a procedure will be attended with any degree of success. Certain it is, that where certain customs have been exercised, both as religious rites and otherwise, as, for example, among the Arabian, Jewish, and other races, where circumcision has been practiced since time out of memory, the effect has not been different on the offspring than in races where it has not been done. The Jewish race, especially, where circumcision is practiced as a religious rite in the early days of infancy, and where selection is made in mating, at least to a certain extent, would seem to offer the conditions necessary, yet we find these children not different at birth from other children.

If this is true of physical attributes, how much more unlikely that mental attributes should be inherited!

Physical characteristics exist at birth; but the mind is entirely the result of development, and it develops absolutely as it is trained. If we expect criminals to beget criminals, so, on the other hand, we should expect highly-educated and intellectual people to transmit to their offsprings greater intellectual qualities. We know that this, as a rule, is not the case. Nobility of character and intellectual qualities do not, necessarily, descend from father to son as a natural heritage. The only influence such a parentage can have is the advantage of training and development, and the force of example during the developing period of the child's life. The same may be said of the criminal. The only direct result of criminal parentage is the criminal training during childhood. The individual who neglects the moral training of his child, expecting of his offspring great results because of his own greatness and goodness, will find, often too late, his error. Proverbs xxii, 6, says: "Train up the lad in the way he should go, and when he is old he will not depart from it."

"Heredity," in this connection is, therefore, a misnomer. In

its place should be put the word "environment," which includes everything else. Impressions made in childhood by force of example, teaching and general surroundings, are the factors which determine, as a rule, the course of the adult. In the diary of a friend, lately deceased, was found this entry: "Every word spoken, and every gesture made in the presence of a child, has its influence in the formation of that child's life." Gay has said: "The hand that rocks the cradle rules the world." The worship of wealth and position, the teaching that might makes right, all these become to the growing mind influences which determine its future course.

But environment, beside embracing parentage, training, and all external surrounding; includes also factors within the individual himself which affect the teachings, whether they be for good or evil.

The blind child, for example, would be entirely unaffected by its surroundings if it had no other means of communication than vision. Environment, therefore, must include the avenues through which education is acquired. What are these avenues?

At birth the human being is simply a creature of physical development; intellectual development comes later. The child of the most refined parents can be made a criminal, and so the child of the most depraved parents, if taken immediately at its birth, can be developed into the highest type of human being. I have no doubt that, if a child were allowed to grow to manhood without mental training of any kind, he would develop into just such an animal as our earliest ancestors are said to have been.

Education begins in infancy, through our mental appreciation of objects around us, the existence of which is demonstrated to us through the medium of the eye. Other avenues contribute to the result, as the other so-called special senses. In the absence of vision, as in children born blind, or who lose their sight through accident or disease, these avenues can be made to fulfil the natural function of the eye. Instances are not wanting where people who were blind have become highly

educated through the sense of touch. Here one special sense, in the absence of another, is made abnormally sensitive. This, however, is unusual.

Education in the earliest days of life is purely imitative. We speak the language of our parents because that is the one we most often hear. A child, born of English parents, transferred at an early period of life to a German surroundings, would become, in speech, action and thought, German. The characteristics of his forefathers would be entirely foreign to him. Not only this, but his physical peculiarities, if nations can be said to have any physical peculiarities, would be German. So a child born of refined parents, put under the influence of less refined people, would develop on a par with his surroundings. If, perchance, in his manhood, he should rise above their level, it would be purely accidental.

One takes pride in the traditions of his country simply because these traditions have been dinned into his ears since his earliest recollection. The native-born American, educated from infancy on foreign soil, would fail to be fired with enthusiasm at hearing for the first time the martial airs of his native land. The love of country, like the love of home, is purely the result of education. G. H. Lewes, in his life of Goethe, says: "It would be nearer the mark to say that man is the architect of circumstances." But this can be only partly true, and a very small part at that. The circumstances over which man has control are very few, while the forces over which he has no control whatsoever, encompass him on every side. Verily, man is the creature of circumstances. Surrounded only by moral teachings, seeing only beautiful objects, subject to nothing which can mar the harmony and peace of life, it is impossible that moral crimes should exist.

Unfortunately, we are so situated that this ideal life cannot be led. The child of the most refined parents has presented to him objects of the grossest immorality. He is forced to compete with vice in every form, so that the influence of good teaching is counteracted by the influence of bad. These influences which are bad may come from external forces, or from

defects which are in himself. I shall not consider here the influences which may come from physical defects generally, but will confine myself to influences which come from defective vision.

The young infant takes very little note of retinal influences. Soon, however, the child begins to notice objects around him, and, depending on the perfection with which these objects are portrayed on his retina, does he sluggishly or rapidly appreciate what he sees. The eye is simply a camera which pictures surroundings perfectly or imperfectly in accordance with the perfect or imperfect condition of the organ itself. Astigmatism, for example, when it exists, is supposed to be congenital. The axis may be any direction from vertical to horizontal. When it is oblique, and the axes of the two eyes parallel, objects viewed must be tilted. That such a condition occurs is shown by the fact that when, in after years, the refraction is corrected, the correcting glass will cause objects to tilt in the opposite direction, for the time being. Here, then, on the threshold of life, occurs an element of danger. Some mental effort, involuntary no doubt, is necessary to enable the possessor of such a condition to see the world as others see it.

Excessive amounts of hypermetropia call for increased muscular efforts beyond the normal, to accurately portray on the fundus of the eye objects viewed. Muscular effort, accommodation as it is called, is necessary for any one to see clearly and distinctly. Vision is never in any sense passive. All of our special senses, when employed to their fullest extent, require concentration of force. We hear sounds vaguely; suddenly a familiar tone strikes our ear; we stop. We concentrate all our energies in the act of listening. The same with smell and touch. We feel in our hands a substance,—a fabric, perhaps. We feel it carefully, shutting out everything else; we concentrate all our energies on the sense of touch. So with vision. Our eyes take in many things as we aimlessly gaze about us. But, when we wish to see distinctly, we ignore everything else for the object looked at. This may be called that indefinable force, mental concentration, but it implies in-

voluntary muscular action, as well. The individual with imperfect organs of vision labors, therefore, under a disadvantage, and if he sees as well as others it must be with greater muscular effort. He uses up force in trying to get perfect images that the person with normal eyes need not expend for coming to logical conclusions.

Knowledge is acquired through impressions made on the organs of special sense. It is through these channels that we obtain absolute knowledge. Inferences can never be designated as facts. Facts are what we see and hear. The ordinary witness in a court of law, except it be in expert testimony, would never be allowed to give opinions; only what he absolutely knows, from what he actually sees and hears, is admitted in evidence. How essential it is, therefore, that he should have these organs in a condition capable of seeing and hearing correctly. Great interests,—a life, perhaps,—may depend on their perfection. Even judges and experts will vary in their thoughts and opinions, depending on the precision with which they grasp facts as they are seen or heard. Opinion is merely the expression of thought, and thought the expression of sight and hearing. There are very few people in this world who will doubt what they actually see; hence the saying: "To see is to believe."

The mechanism of vision is simple in so far as the eye itself is concerned. Rays of light emanating from luminous bodies pass through the air, penetrate the eye, and on the retina is depicted an inverted image of the object viewed. If it were here appreciated, the world and all thereon would seem inverted; but by some means, to physiologists unknown this picture is taken up by the optic nerve, carried to the brain, and there seen in its upright position. If the eye is imperfect the image must be depicted on the retina in a distorted condition. If there existed in the eye itself no compensating power, this distorted impression would be carried to the brain in a condition unlike the original. It is evident that the possessor of such an eye would have, at best, a very imperfect idea of things as they actually exist.

Fortunately for mankind, the eye is provided with a compensating apparatus in the muscle of accommodation. A common example is this: A person enters a room; on a table is an object which to the observer seems an image of some horrible things. So hideous is it that it inspires a feeling of fright. He fastens his eyes on it, and gradually its irregular outlines straighten, and the fear-inspiring object becomes a masterpiece of most beautiful and exquisite statuary. The feeling of fear becomes one of admiration. But the real appreciation in this individual requires time. If a series of objects pass rapidly before his eyes, it is evident that, in the time required to see all distinctly, much must be lost. If it should so happen that the error in such eyes as these is greater than the power of compensation, a correct appreciation of objects viewed would be impossible. It is difficult for one not so situated to fully appreciate the condition of mind engendered by such a defect. Yet as much is expected of this being as of his more fortunate fellow.

The result of such a condition may be varied. Some may be content to accept the fact as it is. They would be designated as stupid. Some, by persistent exercise of will, may develop their accommodative powers sufficiently to overcome the trouble, but it will be at the expense of some other portion of the human machine. Some, battling against these odds, may not be so happily constituted and fail.

The first accepts defeat and says no more about it. The second achieves success at the expense of general health. He is irritable, dyspeptic; he is said to have an excess of bile, and so on. The third, which will constitute a large proportion of people so affected, will writhe under defeat. They will be the disappointed people. Unwilling to accept places in the lower walks of life, they try to compete with their more favored brothers. But they are handicapped, and failing in the race because of the unequal struggle, they seek to gain by foul means what they cannot get by fair. And so, from childhood up, the world to them is never quite right. They are taught to think white when they see black. What they are told is

straight, to them seems crooked. How can an individual so weighted be expected to be like other men? To him things are never as they seem. He thinks the whole world is wrong. He becomes a criminal from necessity.

Here, then, it seems to me, is the explanation of the statement that education increases crime. Education gives to its possessor an advantage over his less favored brother. It gives to a community a refinement which causes it to include in the category of crime, actions which would be looked on less harshly were the standard lower. It makes also the competition greater, and, as the race is always to the swift, the man who is weighted with physical disabilities must, unless he is capable of unusual effort, bring up in the rear. Nothing is so disheartening as continued failure and defeat. To borrow an expression from one of our evening papers, "if nothing succeeds like success, nothing fails like failure."

Through the kindness of my friend, Dr. Van Santvoord, and the Board of Directors of the Society for the Reformation of Juvenile Delinquents, I have been enabled to make some observations in the institution they so ably manage. I desire to express to them my thanks. The reformatory is situated at Randall's Island, and receives children from certain parts of the State who are committed by magistrates for offenses, criminal and otherwise. I expected, of course, to find many cases of defective vision among so many children, taken, as they are, from the lower classes. The ages range from eight to nineteen years; the average of those examined being about fourteen years. The authorities were very anxious to have the matter inquired into, and sent me first those who complained of their eyes, or who were thought, by the teachers, to have defective vision. Any one who has had dealings with children in institutions will know that, to ask the children themselves who among them had trouble of this nature, would be to elicit an affirmative answer from nearly every one of them. But, a careful canvass of the school by Mr. C. W. Manchester, the principal, brought forth seventy-five children who either could not see well, or else complained of their eyes paining them. Of

this number, 51 or 68% were found to have defective vision.

The test of vision was the ability to read the line of the test-card which, at a distance of twenty feet, forms with the eye an angle of 5'. I think that this test is low; for, in an experience extending over a period of thirteen years, in the New York Eye and Ear Infirmary and the Manhattan Eye and Ear Hospital, where together, perhaps, thirty thousand or more patients are treated yearly, I have been forced to the conclusion that normal acuity of vision is greater than $20'/xx$, is not less, in fact, than $20'/xv$, and it is not unusual to have nearly, or quite, $20'/x$. I think, therefore, that, while normal vision may range between $20'/xx$ and $20'/x$, a vision of $20'/xxx$ may safely be said to be defective. My work was interrupted because of my own lack of time, but I was enabled to make an examination of some twenty-six more children who had never complained in any way of their eyes, and who were not supposed to have any trouble of this nature.

The result was certainly surprising, for of these twenty-six, fifteen or 57.5% were found to have defective vision. I see no reason to doubt that this would have been the result if the entire institution were gone over carefully, and every child examined. There was no discrimination in the selection of these twenty-six children; they were taken one after another as they happened to come. Of the total number—101—examined, 65; or 64%, had defective vision. The small number examined is, of course, not sufficient to draw conclusions from, but it is, at least, suggestive. I do not know how this would correspond with the conditions existing generally, in public schools, and in institutions not reformatory, but I do know, that many of the defects existing could be easily remedied if oculists were attached to all institutions where children are educated. The Board of Directors of the House of Refuge have, I am glad to say, since appointed a capable oculist, and I am sure good results will come from it.

We have now considered the origin of crime in the beginning of history, and the causes that perpetuate its existence, and govern its increase. We have endeavored to confine ourself,

as nearly as possible, to the physical side. The moral side is not less important. "Man's inhumanity to man makes countless thousands mourn;" but if we took up the subject in full, going into details on every side, the discussion would be never-ending. We have considered that heredity, *per se*, plays an insignificant part in the production of crime; that environment predisposes man to good or evil, but that the all-important element is education, and that education may be acquired with ease or difficulty, according as the avenues; through which it is acquired, are perfect or imperfect. We must therefore consider, finally, how the disastrous effects of imperfect vision on man's intelligence can be combated.

Optical defects may be congenital or acquired, permanent or temporary. Many of the permanent defects are congenital, but some are acquired in the early days of life, and are avoidable. We find in Noyes, on "Diseases of the Eye," a statement of over 3,000 cases of blindness made by Magnus, in European institutions, 53% of whom were incurably blind from Ophthalmia Neonatorum. If the number were known, of children with imperfect vision as the result of sore eyes in infancy, the figures would be astonishing.

Sore eyes in infancy, ophthalmia neonatorum, is, I think, absolutely preventable. It is quite the rule to find more or less conjunctivitis in the newly-born infant among the poorer class of people, in the tenement-houses. Recognition has been taken lately, in requiring midwives to call in physicians when the baby's eyes are sore. Within the past year, two midwives at least have been given cause to remember that such a law exists. Not only midwives, but physicians do not give to this matter the attention that its importance demands. It should be the care of the medical attendant, at the birth of every child; to personally direct the washing of its eyes. Absolute cleanliness here prevents many disastrous results. Or if, despite every precaution, severe inflammatory conditions should prevail, it is much better to consult an oculist in the early stages, before irreparable damage is done, than to wait until the cornea has perforated, the iris prolapsed, and the eye is perhaps lost.

With congenital defects early attention will often start the child on the right path; while delay may interfere with the chances of success later on. For example: congenital cataract if operated on early, exposes the retina, and enables it to perform its function as Nature intended it should. The question whether amblyopia results from disuse, is one of many sides, but that defective eyes gradually improve when the defects are corrected, is too common an occurrence to admit of dispute.

The advice of family physicians will often determine the fate of these little patients, and it is therefore well that they should especially interest themselves, and study the possibilities in each case. I call to my mind now a child with congenital cataract in each eye, whose only vision was perception of light. That is, the retina was sensitive, so that the distinction between light and dark was perfect. The child was otherwise healthy, and the chances of success from operative procedure were very good. But, physicians are not prophets, and because of our inability to give a positive assurance of perfect success, an operation was refused by the parent. An operation could not have made the condition worse, as perception of light was all that existed, which, for any practical purpose, was useless, while it offered every chance of success. As the result, this child was condemned to years of blindness. Our civilization has not advanced far enough to deny the parent the right to decide its offspring's fate in such a case, but, better would it have been for both mother and child, if some less interested person, as the family physician, could have decided the question. Preventable defects should be prevented, and congenital defects remedied, as far as possible, in the early days or months of infancy. In infancy it is not possible always to detect the defects known as refractive errors, which are by far the most numerous and important; nor, were detection possible, would the treatment be practicable. But, in childhood, that is, after two years of age, not only is detection possible, but easily accomplished, and correction, while sometimes difficult in early childhood, can be, and is, successfully carried out. It is better

to correct glaring defects and deformities at the earliest possible. It is at this time that children first begin to squint. Simple correction with glasses now may not only avoid the necessity of an operation later on, but may preserve useful vision in an eye which would, perhaps, become amblyopic. Young children who blink the eyelids, those whose eyes are oversensitive to the light, those who constantly hold objects too near in order to see them clearly, or who show evidence of any condition which is sufficiently noticeable to attract attention, should receive immediate treatment. The fallacy that children outgrow certain conditions is not confined to the laity. But the outgrowing of myopia or of periodic squint, means, in the first instance, the passage from benign to malignant; and in the second from occasional to constant.

The place, *par excellence*, where the most harm is done, is undoubtedly in the school, and the public school especially, for here is where most of our children, at least in this city, receive their education. I feel that too much cannot be said on this point. The massing of children together, under one system of teaching, without first paying attention to their physical abilities or disabilities, is wrong. We have done much in this city in the improvement of our school-houses; they are better lighted, better ventilated, and in better hygienic condition generally, than they were. It is safe to say that they will continue to improve, for the people generally recognize the necessity of education. But, notwithstanding the improvements in hygiene, in books, in methods of teaching and all, absolutely nothing is done to see that the avenue through which the knowledge is acquired is normal. I am informed by teachers in schools that it is very common to have children who are unable to see the black-board, even from the front row of seats. Some children lose a large part of their time from headaches due to defective vision, or from perfect vision maintained under difficulties. Not only this, but the nervous irritable condition of many school children, and of teachers, too, for that matter, can be directly traced to defective eyes. The number of children affected in this way, I have no means of knowing, but I think an

examination of the eyes of public school children would show most surprising results. How can this evil be overcome? Nothing is simpler. I advocate the examining of the eyes of all children upon entering the schools. We demand that every child shall show evidence of vaccination. A certificate of vaccination is required before the application is even considered. It is equally, and perhaps I might say, even more important, that a certificate of ocular perfection should be required. We cannot cure ocular defects, always; we cannot make a myopic eye shorter, nor can we change the shape of the cornea; but we can correct refractive errors with glasses, and put the possessor of eyes optically imperfect, on an equal footing with his more fortunate fellow. We are met here immediately with an objection. Parents do not want spectacled children, and their objection is reinforced by physicians who, certainly for no other reason than lack of knowledge, do not believe in children wearing glasses.

Not long ago, one of the leading medical journals of this country noticed with regret the growing tendency to put spectacles on children. It is not a thing to be regretted; it is rather a healthy sign of enlightenment and advancement. The growing demands of civilization necessitate one of two things: either the possessor of defective eyes must put on glasses, to make him the equal of his fellow-man, or he must take a back seat. The objections of parents, when forced to consider these two alternatives, will speedily vanish. Of physicians we can only ask that they give the subject careful consideration. Boards of education should have attached to them oculists whose duty it should be to examine, at regular intervals, the eyes of all children in schools. They should report to their superiors and suggest remedies. The question of expense to the community should be of no consideration whatever. The matter should be out of the hands of politicians entirely. The Comptroller of the City of New York may object to appropriations for public school purposes, on the ground of economy, but the question of economy is not considered when he subjects the city to unnecessary expense to gratify his ambition

and increase his salary. There is no economy in stinting the Board of Education. It is absolutely certain that the more we spend on public schools, the less we will be obliged to spend on our prisons and alms-houses.

Not only public schools, reformatories, and other public institutions where children are taught, should have the eyes of inmates examined regularly, but private institutions as well. Let parents fully realize, what they already know in a general way, that perfect eyes are absolutely necessary to success in the competition of this life, and the objection to glasses will, as I said before, soon vanish. After school life the condition of the eyes should determine the choice of occupation. Imagine a boy of sixteen years with a myopia of 20 dioptries, addressing letters from morning till night. I have just such a case in view. The father of this subject is a bartender and has perfect eyes. The son is a clerk and has very imperfect eyes. This is one of the inconsistencies of life easily avoided. Better for this lad had he been a laborer or farmer, or at least in some position requiring less use of visual organs. I consider ultimate blindness almost inevitable in his case.

The law, happily, has interfered in some cases of defective perception, for the public good. The examination for color-blindness has deposed many men from positions requiring the use of normal eyes, and has compelled them to seek other means of earning a living. It is not too much to ask the people to enact laws for their still further protection, by enforcing ocular perfection. The existence of myopia should always, I think, determine the occupation, especially where the amount is great and the tendency is toward progressive myopia. In low degree properly fitting glasses may be all that is necessary. They should be insisted on, however, by medical men and employers. Other conditions, as excessive amounts of hypermetropia and astigmatism, should not debar one from choosing almost any occupation, provided the eye is made normal with glasses. In astigmatism even the smallest error should be corrected. Excessive astigmatism, uncorrected, necessitates poor vision. The result of poor vision is that one

sees slower than other people. With small errors, however, perfect vision is not only possible but generally attained. The person whose perfect vision is maintained under great strain is apt to be abnormally sensitive. The constant sense of alertness necessary to keep track of everything, a condition which is not necessary to the one without ocular defects,—and so impossible of attainment that it is not attempted in the possessor of marked errors,—begets such a condition of general hyperæsthesia that is often never absent, as to render the person so afflicted irritable, excitable, and of uncertain action generally. Who can wonder that this class of people commit all sorts of acts for which they are not, morally, responsible?

And now, in conclusion, let me sum up in a few words the ideas I have endeavored to convey. It is very probable that the human race has altered very little, if at all, since the beginning. There is nothing but theory, and that very far-fetched, to prove the opposite. At any rate, there has been no change since the earliest time known to history. The surroundings, however, are very different. From beging creatures of purely physical development we have become creatures in whom intellect predominates. Our anatomy has not kept pace with the physiological requirements. Spectacles are not evidence of growing physical weakness, but rather of increased intellectual growth. Our eyes are merely the principal avenues through which intellectual food is acquired. If all individuals were alike, and all eyes imperfect, the conditions would be more nearly equal. It happens that very many eyes are as perfect as it is possible for eyes to be, and they confer on their possessors an immense advantage. Man always takes advantage of his weaker brother, who is obliged to resort to other measures in self-defense; if the measures he employs are legal, well and good; if they are illegal, he becomes a criminal.

Do not misunderstand me. Crime has many causes, many features. Defective vision may not be in itself alone sufficient to make a man a criminal, but its influence is great and deserves careful consideration. — *American Medico-Surgical Bulletin.*

REVIEWS.

ESSENTIALS OF THE DISEASES OF THE EAR. (Saunders's Question-Compends, No. 24). By E. B. GLEASON, S.B., M.D. [Philadelphia: W. B. Saunders, 92½ Walnut Street. 1894.

Among the many small compends, this one is decidedly one of the best.

OEUUVRES OPHTHALMOLOGIQUE DE THOMAS YOUNG. TRADUITES ET ANNOTÉES PAR M. TSCHERNING. Publication faite aux frais de la fondation Carlsberg. [Kopenhagen: Andr. Fred. Hoest & Son. 1894.

To the student of ophthalmology no greater pleasure could be afforded than to read this excellent reproduction and translation of the works of Thomas Young, with the learned translator's annotations. Type and illustrations—in short everything—is excellent.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. Edited by C. E. SAJOUS. Vol. V., for 1894. [F. A. Davis, Publisher, New York and Chicago.

These volumes are now too well known to need any further praise. Suffice it, to state that Volume V has appeared.

DIE AUGENÄRZTLICHEN OPERATIONEN (OPERATIONS ON THE EYE). VON DR. WILHELM CZERMAK. No. 6 and 7. Wien. Carl Gerold's Söhne. 1894.

This fascicle details the operations in the orbit and concerning the muscles of the eye and is as complete and excellent as its predecessors. One more fascicle which is still to appear in 1894 will complete this very useful handbook. ALT.

OBITUARY.

LUDWIG MAUTHNER +.

APRIL 13, 1840 TO OCTOBER 20, 1894.

The following touching remarks by J. Hirschberg, Berlin, are taken from his *Centralblatt*:

This morning's (October 21, 1894), mail brings me a letter, stamped in Vienna on October 19, 1894, between 11 and 12 P.M., and which contains the following card:

October 19, 1894.

My best thanks for your friendly and devining wishes. My nomination as Ordinarius and Chief of the I Eye-Clinic has been published to-day only. Friendly greeting,

LUDWIG MAUTHNER.

I suppose, these were about the last lines of Mauthner's. He wrote them late on Friday night, October 19; during that night, from the 19th to the 20th of October, he suddenly died of apoplexy.

Reality is more tragic than all tragedies. For seventeen years he had with unwavering efforts striven for the one price, which, strange to say, he considered the highest good,—the position as Professor Ordinarius in the Medical Faculty of Vienna; on October 19, his nomination for this place is made public, in the following night he dies, 54 years of age—like the leader of an army after the victorious battle.

Ludwig Mauthner was born at Prag on April 13, 1840.

Talent and intellect were his heirloom from his family, which had several renowned members. He finished his studies in Vienna, where he graduated in 1861, and became very closely allied to the genial E. v. Jaeger, who in those days was, however, unknown and being kept in the background. The friendship between the teacher and his pupil was touching. Although E. von Jaeger was a highly gifted artist, to this day still unsurpassed in his ophthalmoscopic atlas of the year 1869, and equaled by few only as a cataract operator,—this modest man said to me in his own operating room in 1871: "Yes, if you want to see *good* operations, you must go to Mauthner."

Mauthner, on the other hand, never tired to put into the right light what was due to his teacher in regard to ophthalmoscopy, measuring of the refraction by means of the ophthalmoscope, and the more exact examination of the visual acuity, and to defend him against one-sided representatives of other schools.

After one short year of wandering, which brought him to Berlin to Graefe and also to London, Mauthner settled in Vienna and, never left Austria again, except occasionally when called in consultation. In 1869 he was called to Innsbruck as Professor Extraordinarius of Ophthalmology. However, he resigned this position of his own will and returned to his beloved Vienna, satisfied to cultivate his modest field as private docent, which strangely contrasted with his unusual eloquence and teaching qualities.

Unbeknown to him I heard his public lectures in 1881. Three students listened to him; two of which were American physicians, who did not understand the language and one a Russian, who did not understand the subject. Yet, Mauthner, discoursed in a truly artistic, completely scientific manner, in the short space of one hour, the whole theory of the ophthalmometer and the measuring of the optical constants of the living eye, as nobody else on the whole earth could have done it. This I know from my many traveling experiences. Such lectures, of course, were too high for the students, who moreover, have obstacles thrown in their way by the obligatory lectures and

the examinations. In private practice, however, he found full recognition and the highest esteem; and in the medical society of Vienna his eloquence always produced an astonished admiration.

His pupils, like Schnabel and Purtscher, loved him with a warm reverential feeling. He did not visit congresses. I think he was only once in Heidelberg. But once he took part in combined literary work, when from 1875 to 1878 he edited the German edition of *Knapp's Archives*, which I edited for three years subsequently.

He has displayed a great fertility as a writer. Untiring diligence, depth and a peculiar style were his attributes, although by his dialectic intellect he sometimes allowed himself to be led to paradox views.

The first work was his text-book of ophthalmoscopy in 1868 (468 pages), the first extensive one, with exact literary reference, and to this date comparatively the most complete one. His second work, lectures on the optical errors of the eye (Vienna, 1876; 878 pages), contains a vast amount of historical researches and personal investigations from the time of Innsbruck, with the most vivid description of an apparently dry subject. After his return to Vienna Mauthner began to publish an extensive series of monographs with the title of: Lectures from the whole field of ophthalmology for students and physicians. Of these have appeared: Functional examination, the sympathetic affections of the eye, brain and eye, glaucoma, paralyses of the ocular muscles. The theory of color-perception, the first part of the functional examination, has appeared in a second, greatly changed edition, but a few weeks ago.

In personal contact Mauthner was one of the most intellectual and humorous men, with whom it has been my fortune to become acquainted. No one, who came in closer relationship with him will ever forget him. Ophthalmology, in him, has lost one of her best representatives.

